One-Dimensional Delta-Function Fermions with Imbalanced Spin Populations

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We discuss a one-dimensional integrable system of two- component Fermi gas with arbitrary spin polarization at zero temperature. This model has been studied extensively by use of the Bethe ansatz. The ground state is described by the set of integral equations for the distribution of quasi-momenta and that of spin rapidities.

The first few terms of the asymptotic expansions of these distribution functions are calculated explicitly for three cases: strong attractive, weak attractive, and weak repulsive case. We then study some physical quantities, such as the groundstate energy and the chemical potentials.